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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)

BUR920040122US1

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Application Number

10/711,953

Filed

10/15/2004

First Named Inventor

Cline, et al.

Art Unit

1765

Examiner

Chen, Eric Brice

on _____

Signature _____

Typed or printed name _____

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

☒ attorney or agent of record.
Registration number 47,820

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

Khôi D. Nguyen
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April 19, 2006
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ Total of _____ forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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GROUND OF REJECTION AND ARGUMENTS

Ground of Rejection 1 (of 1) and Arguments:

Claims 1, 2, 12 and 13 stand rejected in the final Office Action dated January 26, 2006, under 35 U.S.C. §103(a) as allegedly being unpatentable over Liu *et al.* (U.S. Patent No. 6,380,095), in view of Flanner *et al.* (U.S. Patent No. 6,653,734).

Claim 1:

Appellants respectfully contend that claim 1 is not unpatentable over Liu in view of Flanner, because Liu in view of Flanner does not teach or suggest each and every feature of claim 1. For example, Liu in view of Flanner does not teach or suggest the feature "(c) ... forming a second plurality of deep trenches...wherein...the step of etching the bottom portion of the hard mask opening is performed according to a second set of etching parameters, wherein the second set of etching parameters are adjusted from the first set of etching parameters such that, for each trench of the second plurality of deep trenches, a side wall of the bottom portion of the hard mask opening is **more vertical** than that corresponding to a trench of the first plurality of deep trenches." (bold emphasis added).

The Examiner alleged at the beginning of bullet #5 that "Liu teaches that the lateral etching of the overlying hard mask layers can cause the taper of the trench to deviate from the specified angle range (column 8, lines 47-54)." These cited texts of Liu may indicate that the etching (and enlargement) of the hard mask opening is not good. However, these cited texts do not teach or suggest an incentive for a more vertical side wall of **the bottom portion** of the hard mask opening as claimed in claim 1.

The Examiner also alleged in bullet #5 that "Liu further teaches that volumetric gas ratio and other etching parameters can be varied (column 5, lines 22-48) to reduce erosion of the

patterned mask (column 5, lines 17-22)." These cited texts of Liu may indicate that the expansion of the hard mask opening is not good. However, these cited texts do not teach or suggest an incentive for a more vertical side wall of the bottom portion of the hard mask opening as claimed in claim 1.

The Examiner also alleged in bullet #5 that "Moreover, Flander teaches that faceting on the walls of hard mask layer (104) can result in an undesirable enlargement of the trench to be etched (column 4, lines 47-60; Figure 4)." Also, in item 11 of the Advisory Action mailed April 5, 2006, the Examiner alleged that "Flanner discloses that faceting in the hardmask (104) enlarges the via/trench (column 4, lines 56-60; Figure 4). In other words, there is a suggestion in Flanner that a non-faceted (or vertical profile) is desirable because this feature provides the benefit preserving the critical dimension of the via/trench." These cited texts of Flanner may indicate that the enlargement or faceting of the hard mask opening is not good. However, these cited texts do not teach or suggest an incentive for a more vertical side wall of the bottom portion of the hard mask opening as claimed in claim 1.

The Examiner also alleged in bullet #5 that "One who is skilled in the art would be further motivated to select an etching composition that produces the desired angle range, such as optimizing Liu's etching steps to produce a smooth hard mask layer sidewall." Appellants agree that a smooth hard mask opening sidewall is good, but that fact does not teach or suggest an incentive for a more vertical side wall of the bottom portion of the hard mask opening as claimed in claim 1.

In summary, Liu in view of Flanner may allegedly teach or suggest some incentive to (a) avoid expanding the hard mask opening, (b) achieve a smooth hard mask opening sidewall, and (c) achieve a desired angle range for the entire sidewall of the hard mask opening. However,

Liu in view of Flanner does not teach or suggest an incentive for a more vertical side wall of the **bottom portion** of the hard mask opening as claimed in claim 1.

Based on the preceding arguments, Appellants respectfully maintain that claim 1 is not unpatentable over Liu in view of Flanner, and that claim 1 is in condition for allowance.

Claim 2:

As for the rejection of claim 2 in bullet #6, since claim 2 depends from claim 1, Appellants contend that claim 2 is likewise in condition for allowance.

Moreover, Liu in view of Flanner does not teach or suggest the feature "(c) ... forming a third plurality of deep trenches...wherein...the step of etching the bottom portion of the hard mask opening is performed according to a third set of etching parameters, wherein the third set of etching parameters are adjusted from the second set of etching parameters such that, for each trench of the third plurality of deep trenches, **a side wall of the bottom portion** of the hard mask opening is **more vertical** than that corresponding to a trench of the second plurality of deep trenches." (bold emphasis added).

Because step (c) of claim 2 is similar to step (c) of claim 1, the arguments above for claim 1 are also applicable to claim 2. As a result, although Liu in view of Flanner may allegedly teach or suggest some incentive to (a) avoid expanding the hard mask opening, (b) achieve a smooth hard mask opening sidewall, and (c) achieve a desired angle range for the entire sidewall of the hard mask opening. However, Liu in view of Flanner does not teach or suggest an incentive for a more vertical side wall of the **bottom portion** of the hard mask opening as claimed in claim 2.

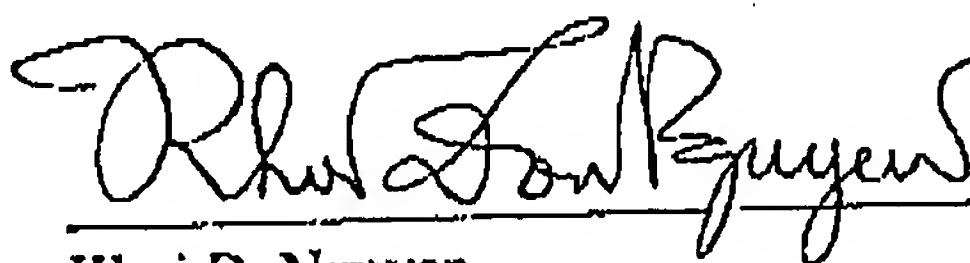
Claims 12 and 13:

As for the rejection of claims 12 and 13 in bullets #7 and #8, respective, since claims 12 and 13 depend from claim 1, Appellants contend that claims 12 and 13 are likewise in condition for allowance.

SUMMARY

In summary, Appellants respectfully request reversal of the January 24, 2006 Office Action rejection of claims 9-12, 14,-15, and 17-20.

Respectfully submitted,



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